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Niemelä, Marketta; Määttä, Hannamaija; Ylikauppila, Mari

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Expectations and experiences of adopting robots in elderly care in Finland: perspectives of caregivers and decision-makers

Marketta Niemelä[1a], Hannamaija Määttä[1b] and Mari Ylikauppila[1c]

[1abc] VTT Technical Research Centre of Finland, Finland

* Corresponding Author: Marketta Niemelä, Tel: +358 40 574 6549, E-mail: marketta.niemela@vtt.fi

Abstract

Care robotics is a growing field of innovation and commercial robot applications are little by little entering in the daily care work. This study explores the process and criteria of adopting robots in elderly care in Finland. In particular, we are interested in the expectations that decision-makers in care have for robots, how the decision to purchase a robot is made, and which criteria is used to assess the success (or failure) of the robot in real use. We supplement our interview data from two decision-makers with the perspective of caregivers who have experience of taking a robot (Paro) into use in their daily care work. The results indicate that the interest in care robots is shared by decision-makers and care workers but their expectations of suitable applications may vary. The motivation behind the purchase and use of the current applications in dementia nursing homes is related to quality of life and positive PR value (and not to increasing cost-efficiency in elderly care). In practice, the expected benefits of the new applications may not realise due to the requirements of the daily work as well as lack of encouragement and training.

Keywords

Elderly care services, technology adoption, robots, Paro, technology procurement

1 INTRODUCTION

In 2020, Finland is expected to have 22,6% of its population over 65 years old (Statistics Finland 2015b). The share of elderly population is expected to increase till 25,6% in 2030, when the dependency ratio would be close to 70, meaning that there will be almost 70 dependants (children under 15 years old and elderly over 65 years old) for each 100 citizens in working age (Statistics Finland 2015a). Finland is currently starting a major reform in how social welfare and health care services will be arranged in the future, to meet the growing needs of the citizens in an equal way and with costs manageable to the society (Ministry of Social Affairs and Health Finland 2016).

Digitalisation and ICT have a big role in the reform. The public policy perceives digitalisation to bring major benefits as increased efficiency and productiveness in care service systems, support for people to take more responsibility of their self-care, and new business opportunities (ibid.). As part of digitalisation and ICT, robotic technologies have gained growing interest as well: the Finnish Government have released a government resolution of intelligent robotics and automation ("Valtioneuvoston periaatepäätös älykkäästä robotiikasta ja automaatiosta" 2016), in which social and health care is mentioned to be one of the primary application areas for robotics.

The idea of using robots in elderly care have settled in a somewhat fertile background in Finland, as a recent European-wide survey (Special Eurobarometer 427 2015) shows that 73% of Finnish citizens perceive robots in a positive light, compared to 64% of Europeans in general. Also, Finnish persons over 55 years are more positive towards robots than Europeans (65% vs. 56%). When particularly asked about using robots in elderly care, the attitudes are more negative. Half of Europeans (51%) say that they are *not* comfortable with the idea of having a robot to provide services or companionship to elderly of infirm people, and the same goes for Finnish citizens (ibid.)

Nevertheless, more focused research indicates that elderly people are willing to use robots when there are clear benefits. For instance, robots can maintain their autonomy by helping them in heavy physical tasks such as cleaning and moving heavy objects (Ray, Mondada and Siegwart 2008). Also social uses of robots such as Paro the therapy robot seal (Shibata 2012, Wada, Shibata and Kawaguchi 2009) or Alice, a small humanoid companion robot (Kemenade, Konijn and Hoorn 2015) have been argued to have benefits for elderly users. Robots thus may have real market interest, but to date however only a few robot applications have reached commercial success so that they have really been adopted in elderly care. In Finland, there are – to the knowledge of the authors – two such robot applications: Paro and a small social humanoid Zora, which is based on the Nao robot platform by Softbank Robotics (former Aldebaran). Approximately 20 Paros has been sold in Finland during the last years to be used elderly care facilities (personal communication with the Finnish importer company of Paro) and a few Zoras, humanoid newcomers in the care robot market, have been purchased

by both private and public service providers. In addition, several empirical trials with other robots (e.g., a robotic rollator or a tele-presence robot) are on-going or planned to be carried out, and with the maturation of the technology, it can only be expected that more and more robots will be adopted in Finnish elderly care within a few years.

This study explores the process and criteria of adopting robots in elderly care in Finland. In particular, we are interested in the expectations that decision-makers in care have for robots, how the decision to purchase a robot (or start a trial with it) is made, and which criteria is used to assess the success (or failure) of the robot in real use. A focal sub-question is who can participate in the decision-making. If the elderly and caregivers are the main end-users of the technology, how is their voice heard in the decision making about the robot, and how their contribution could possibly be improved? We complement our data from decision-makers with the grass-roots perspective of caregivers who have experience of taking a robot (Paro) into use in their daily care work.

For research questions we have set:

- What kind of a **decision-making process** adopting a new technology such as a robot application into elderly care is? Who can participate and contribute in the decision-making?
- What kind of **expectations and success criteria** there is for a new technology such as a robot application for the adoption and use in elderly care?
- What kind of **experiences** there are of adopting a robot application in elderly care?

2 BACKGROUND

Robotics is an established branch of technology development but care robotics is quite a new arrival in the field. According to Goeldner and colleagues (2015), the patenting and publishing activities in care robotics have started to increase in 1970's, but the explicit purpose or usage of robotics for elderly or disabled care shows in patents and publications only in 2005 and after. Currently, the most active countries in development are Japan, South Korea and China. Also the US and Germany carry out influential research and development work on care robotics. In spite of the increasing amount of effort of companies and research institutes to produce solutions for the market needs, only a few care robots products have been able to gain commercial success so far. In addition to technical challenges, there are other barriers such as legal, financial and safety-related issues as well as somewhat low acceptance of care robots (Goeldner, Herstatt and Tietze 2015), in particular, among European citizens (Special Eurobarometer 427 2015).

Indeed, half of Europeans (51%) say that they are not comfortable with the idea having a robot to provide services or companionship to elderly of infirm people. Similar findings have been reported for instance in the survey study of Ray, Mondada and Siegwart (2008), according to which only 22% of 240 respondents would like to be taken care by a robot when old.

On the other hand, people seem to accept robots to do cleaning and other heavy household tasks as well as other laborious work in daily life. In the survey of 2000 respondents by Arras and Cerqui (2005), 83% accepted robots to help in regain independence if old or handicapped. Especially the older respondents accepted the idea (up to 90% of older respondents). So it seems that people's willingness to take a robot into use increases when they find it useful for themselves.

In addition to robots capable of household and heavy tasks, elderly people have expectations on socially assistive robots as well. According to Pino and colleagues (2015), the most preferred functionalities for SAR in daily life are cognitive support (e.g. cognitive stimulation, object finding, reminding), communication services to keep an active social life, risk prevention and healthcare applications, and applications for supporting everyday tasks (e.g. online shopping, journey planning).

The expectations and needs of other stakeholders than elderly users are less well understood. In a recent literature review, Kachouie and colleagues (2014) reported that only a few studies on socially assistive robots in elderly care include stakeholders other than the elderly. Both care workers and service providers are important stakeholders whose perspective needs to be investigated to understand the acceptance and adoption of robots in elderly care. (There are other important stakeholders as well, such as insurance companies, but we limit our article to professional caregivers and managers of service providers).

According to Glende and colleagues (2015), the opportunities and advantages of service robots for caregivers and managers include reduction of routine work, more time for qualitative care, physical support during care situations, as well as reducing costs. There are also risks and disadvantages for these stakeholders: for instance, the inability of the personnel to use technical devices due to lack of experience and low motivation, or due to fear of labour displacement. Care professionals may also worry about quality of supply and safety aspects in care.

The services that the professional care stakeholders would like robots to provide include support for communication, indoor escort at night, reminding, object transportation, laundry support, garbage collection, outdoor walking support, drug and shop item delivery, and surveillance (ibid.). For eldercare hospitals, care professionals have presented the following needs and requirements (Hebesberger, Körtner, Pripfl and Hanheide 2015): "fetch and carry" (item, mail, medical dispense), greeting and guidance service for visitors as well as patients, mobile information terminal service, and entertainment (e.g., memory and quiz games). A robot could also provide support in therapy and carry out security tasks. An important requirement is that the robot should not replace care staff but support it.

Apart from attitudes and expectations, there is little research on real-case experiences of robots in elderly care. Paro the therapy robot seal is an exception as it is one of the few robot applications that has gained commercial success and has been in long-term use in care facilities. Considering the perspective of professional caregivers, they have been reported to perceive Paro as positive and useful for the elderly (Wada, Shibata and Kawaguchi 2009). They use Paro 1-3 hours per average week, usually as an activity to stimulate or entertain residents and only sometimes as a socio-pedagogic tool (Klein, Gaedt and Cook 2013). Paro has also improved the moods of the elderly residents, which

has been reported to cause decrease in mental impoverishment of the nursing staff (Wada, Shibata, Saito and Tanie 2004).

Our study contributes to this body of knowledge by providing research data on the expectations and experiences of adopting real commercial services robots in elderly care.

3 CASE CONTEXT AND METHODOLOGY

In this paper, we investigate the perspectives of Finnish managers (decision-makers) who are responsible of the quality and development of care services in their organisations, and professional caregivers. Concerning the type of elderly care, we concentrate on extra care sheltered housing services (e.g. 24h dementia care in service home).

For understanding the decision-makers' perspectives we held two semi-structured interviews during spring 2016. We interviewed a quality and development executive at a large private care service provider company (case organization A) and a director nurse at a public organization providing elderly care services for the residents of small sized Finnish municipality (case organization B). The case organization A had procured a Zora robot that circulates around Finland in their elderly care homes. The case organization B had procured a few Paro robots to be utilized as a part of care at their elderly care homes in the municipality.

To supplement the data from decision-makers with actual user experiences and expectations of caregivers, we include here partial results of a focus group study in three dementia care homes. The three focus group interviews, with altogether 10 professional caregivers, were carried out during spring 2016 in order to study usage and perceived value of Paro in Finnish elderly care. The focus groups also gave us information about the adoption of Paro as well as the caregivers' expectations on other types of robotic applications in nursing homes. The main results of the study are presented elsewhere (Niemelä, Ylikauppila and Talja 2016). Here the results are utilised only to the extent they contribute to our understanding of the decision-making or the adoption and expectations of robotic applications in elderly care.

The summary of our data gathering is presented in Table 1.

Table 1. Summary of data gathering (* years of experience in care work)

Participant(s)	Role/perspective concerning the study	Data collection method
1# Quality and development executive in an large care service provider company	Decision-making process, expectations and criteria for adopting technology in care services in the private sector	Interview (approx. 80 min.)
2# Director nurse in a municipality of 33 000 inhabitants	Decision-making process, expectations and criteria for adopting technology in care services in the public sector	Interview (approx. 100 min.)
3 caregivers: - A practical nurse, 17 yrs.* - A nurse, 15 yrs.* - A head nurse 15 yrs.*	Experiences of adopting Paro in dementia care; expectations toward robots in dementia care	Focus group interview in a nursing home
5 caregivers: - A practical nurse, 20 yrs.* - A practical nurse, 10 yrs.* - A practical nurse, 10 yrs.* - A head nurse, 30 yrs.* - A practical nurse, 5 yrs.*	Experiences of adopting Paro in dementia care; expectations toward robots in dementia care	Focus group interview in a nursing home
2 caregivers: - A practical nurse, 30 yrs.* - A practical nurse, 36 yrs.*	Experiences of adopting Paro in dementia care; expectations toward robots in dementia care	Focus group interview in a nursing home

4 RESULTS

4.1 Procurement process of robots – cases Zora and Paro

Zora at case organization A

Decisions on adopting new technology at the case organization A, a private company providing elderly care services, depends greatly on the offered solutions and all decisions are made case by case. The process is different with each technology case, but some general steps can be identified. The process starts with a contact request by a technology provider to the organization's quality and development executive. The organization receives offers by phone or e-mail almost daily. If some solution is interesting, it can be tested at one of the care homes. A development project (technology trial) is formed around the technology, during which continuous collaboration with the technology provider and the organizations is essential. The trial is then evaluated by how the expected benefits were realized in practise with calculations. Also other secondary benefits are considered. The procurement decision made based on evidence of the cost and benefits from the technology trials at care homes, or from other companies' experiences. Though the "final stamp" on the procurement decision is always done by the CEO and supported by the quality and development executive, other actors are considered to be very important in making the decisions. If the technology directly affects the work of employees at care homes, the decision for procuring a new technology cannot be made "top-down" - the final green light has to come from the field. The area manager, the care home manager and the personnel at the care homes are in an important role in reporting their experiences regarding the technology; what kind of impact it has on the personnel's work, what has been negative, what positive, what is the barrier to adopt the

technology, what has gotten resistance and so on. All aspects are discussed and reported, and taken into account when making the final decisions. After the procurement decision has been made, an implementation project coordinated by the quality and development team of the case organisation is formed. The project follows a certain format, and all communication with the care homes and the technology provider go through quality and development team. The project includes a very systematic process of internal marketing and training, which are seen very important. The goal is to make the purpose and value of the new solutions easily understandable for the care personnel, who might resist the changes.

In the case of Zora, the importer of the robot contacted the quality and development executive of case organization A by e-mail, with a picture of the robot attached. It was the first humanoid robot for care services in Finland. The first impression was that "okay, another robot", but when the importer, the quality and development executive and the CEO of organization A sat in a meeting where the robot was physically presented, they were immediately impressed by its hypnotizing movements. The decision to purchase Zora was done in half an hour. They saw the multiple possibilities for utilizing of Zora at their care homes in different kind of activities, for example chair exercises, salsa dancing, and word games. The purchasing process differed greatly from other technology purchasing processes, such as procuring new reporting software. In the case of Zora, the quality and development executive and the CEO found the potential PR-value for the organization to be so significant, that it was worth to try out. Another important factor was that this kind of robotics meant for bringing joy at the care homes would bring positive publicity generally to the entire care work industry, as usually news reporters tend to bring out only the negative aspects of care work in the media, particularly related to robotics. This kind of experiment would "break the ice". By purchasing Zora the organization aims to enhance a wider mind-set change in the care industry. The publicity related to the case organization and generally the care work industry is closely followed by the organization's communications unit, and with the Zora robot they noticed significant peaks in positive media hits. Our interviewee described also the care personnel's reaction to Zora, and how they first reacted that "here come the robots to take our jobs". This changed as the use of Zora requires the work effort of two care persons: one to control Zora and one to be there for the elderly. Particularly the elderly are very excited about it, as our interviewee put it:

"…I was thinking that, we'll see how the elderly will feel about it… After all, they are the generation that has seen when the first cars arrived to the roads. But the reactions were unbelievable. We have many pictures, and the facial impressions of the elderly are just unbelievable. Just unbelievable. The impression on their faces tells it all. And they kiss, and embrace… and talk to Zora…"

In a short time, the reception of the elderly and the care personnel was enough to show that it was a success. The benefits of procuring Zora were so visibly seen, that there was no official report or evaluation made out of the trial.

Paro at case organization B

The case organization B, which is a publicly funded organization providing elderly care services, has to be very active by themselves in searching for new technologies that interest them – the technology providers rarely contact them directly, and only few offers come straight away, and are usually very traditional: auxiliary devices or customer satisfaction data gathering applications. Usually the process for technology procurement starts from someone's idea at the care units. The employees might have seen some interesting technology somewhere and ask the director nurse is it currently used in the care homes, after which the director nurse makes an enquiry on it; which companies provide/import it, where are they available and how much they would cost. Procuring new technology requires a responsible person who makes the thorough research and is able to give reasons to back up the procurement. The ground work has to be made into a report, which includes all relevant information including the costs and how many they would like to purchase. After this, the issue is brought to the table of the Health and social welfare steering group of the municipality. The group has a meeting once a week, and the procurement decisions are made in these meetings. The steering group discusses what kind of benefits there could be and considers possible user experiences from other places where the technology might have been used. The priority for technology procurements are the kind that are statutory, but after they are in order, the case organization considers other types of technology, for example the Paro robot.

In the case of Paro, the solution evoked great excitement among the steering group, and there was money to be allocated to such procurement. The case organization receives significant funding from testaments addressed to elderly care work, of which some money can be used for purchasing new technology. Before making a decision, the case organization might also request an introduction and sometimes a test run from the technology providers, depending on what kind of technology is in question. Regarding Paro, there was one small trial introduction, after which the final decision to purchase them was made. News about the experiences from other care homes in Finland first sparked the interest of procuring Paro, and the possibility to bring good feelings and pleasure in the form of different kind of stimulation. The case organization was curious to see how the robot works in the case of people with serve memory loss and behavioural problems. The steering group was also excited of having something new and completely different in the care work. The offer made by the technology provider was also considered to be a good package, including training for the care personnel and maintenance of the robots. They chose specific Paro-responsible persons who participated in a training organized by the technology provider. Evaluating the success of the procurement in the case of Paro is done as a part of the regular reporting of needs-based care plan of the elderly. The primary nurses report on a daily basis of the entity of care. Reporting and monitoring is important, as it shows the quality of the care work. The reporting is very descriptive, not so much quantitative data. Regarding the experiences of using Paro in practise will be described in chapter 4.3.

The summary of the elements included in the decision making process of both our case organizations is summarized in table 2.

Table 2. Elements of decision making process regarding robotic solutions

	Technology procured	Important criteria for decision-making	Participants in decision-making	Evaluation of the success of the technology
Organization A (private company)	Zora-robot	• The features of Zora: it's movement and various activity possibilities provided by the robot for the elderly • PR-value: advertisement of care organization's services • Marketing-value of the care industry in general: positive communication about care work, which is usually discussed in media only in negative terms • Enhancing the mindset towards robotics: "breaking the ice"	• The quality and development executive • CEO of the organization	• PR-value: monitoring of positive media-hits • No other evaluations or official reports needed; the experiences of the care personnel and the elderly are so clearly visible
Organization B (small-sized municipality)	Paro-robot	• Specially allocated funding that was available for this kind of purchase • Previous experiences from other care homes in Finland • The possibility to bring good feelings and pleasure in the form of different kind of stimulation • Curiosity to see how the robot works in the case of people with serve memory loss and behavioural problems • Something entirely new and different • Good offering package: training and maintenance included	• Health and social welfare steering group of the municipality	• No specific evaluation methods for the technology • Reporting and monitoring are done as a part of the regular daily reporting of needs-based care plan of the elderly • Descriptive reporting, not so much quantitative indicators

4.2 Expectations towards new technologies in elderly care services

At case organization A, they are not actively searching for new solutions, as the technology providers come and find them. Currently, the organization receives offers from many technology providers, but the solutions are not seen to bring any benefits for them. This is why very few trials are going on at the moment. It is widely acknowledged that technology will increase at the elderly care industry, but in the case of long-term care homes, our interviewee emphasized that it has to be remembered that the residents will only be there for 6 months or maximum few years, and the value for them comes from social interaction, not from "gadgets". Being in contact with family and friends, and the presence of nurses is what increases the quality of life.

Still, the interest in new technologies is great, particularly for social robots like Zora, that bring new type of joy to the elderly; robotic lifting devices that the care personnel can wear to lift the elderly in a safe and ergonomic way; ICT-solutions that enable communication between the family members and the elderly; and smart mobile documentation technology for care personnel increasing the efficiency of knowledge sharing. These types of technologies are something the case organization would want to try out. Monitoring technologies and sensors, however, are not interesting for them. Our interviewee reported that it is not sensible to invest in such expensive solutions from a cost efficiency perspective, as they would perhaps enable the prevention of few falls of the elderly. Developing work practises to prevent such kind of situations would be considered more valuable.

At case organization B, they have procured various technologies that are not statutory but are considered beneficial, for example beds that descend to the ground, and are safer for elderly who are restless during the nights and tend to roll over. The important aspect in purchasing these kinds of solutions is safety of the elderly and respect for their autonomy (not tying the elderly onto the bed with belts). Lifting technologies in general are considered very beneficial, as they are safer, more ergonomic and pleasant to use in care situations. Reminder technologies (robotics-enabled) are also considered interesting. This kind of technology could bring the feeling of safety for elderly with memory loss: "someone takes care of my medication". As an example, the interviewee mentioned sensor technology that has been in use in Belgium in home care. They use sensors inside artwork on the walls: the elderly know it's there, but it is pleasant to look at. It brings the feeling of safety: "someone knows I am here, in case something happens during the night", for example. Monitoring

technologies that would take your blood pressure information to the doctor directly is also considered interesting, particularly in home care. But the problem was reported to be the complex patient information systems and data security issues. The interviewee also discussed about virtual technology that could bring art and nature experiences to the elderly at care homes in the form of sounds and images of nature. Virtual tours outside would bring joy to the elderly who would like to experience nature, but are reluctant to go outside. The value would be in bringing the nature to them in a safe environment.

At case organization A, the factors considered when the thinking about procuring new technology at the case organization A are 1) *user friendliness of the technology*; the solutions have to be easy enough to use; 2) *cost savings*; the technology should reduce costs directly or indirectly by e.g. personnel's wellbeing and reduced absences; 3) *PR and marketing value*; advertisement of care organization's services and bringing out the positive features of care work in general; 4) *value for the elderly*; the solutions should increase the "resident satisfaction" at the care homes; 5*) value for the family*: are there any possible benefits for the family also that would increase the "family satisfaction"; and 6) *value for the care personnel*; how it impacts their work: does it ease the work load, will it bring new type of meaningfulness for their work (by e.g. bringing new value for the elderly and family), and how do the personnel feel about the technology.

At case organization B, the important factors to be evaluated when procuring new technology are 1*) possible cost savings*; 2) *impact on the efficiency of care processes*; 3) *customer satisfaction*, which is the most important indicator of the quality of care; 4) *user training support and maintenance possibilities* offered by the technology provider; and 5) *image-issues:* technologies that are different and bring employee and customer satisfaction, would bring positive publicity for the organization, and as a side effect also attract workforce to the field.

4.3 Experiences of adopting Paro in elderly care services

All three nursing homes had had access to Paro for at least one year. However, Paro circulates between departments so the caregivers in one department typically used Paro 1-2 months at a time and could have periods of several months of non-use.

The caregivers admitted that they had had prejudice against Paro before the purchase. They felt that Paro was too expensive to its usefulness – one interviewee compared Paro to a "rock doll" brought from Thailand: what can Paro do better than the cheap doll that makes people laugh by walking in the rhythm of rock music? – and too childish. However, many had had to give up their assumptions when they started to use Paro themselves (or observed it in use). The emotional and social impact of Paro on the elderly residents was perceived to be significant and positive. Indeed, the main value of Paro to the caregivers was in helping them to give good care and bring "good moments" to the residents (cf. Niemelä et al 2016).

Although the interviewees personally perceived the benefits of Paro, no clear routines or practices had been established to use Paro in a systematic or purposeful way to improve quality of life or decrease anxiety of the residents. The use of Paro appeared to be very dependent on person as well as situation. This was due to several reasons: although Paro had been (in principle) available for a year or more, it circulated between several departments and even buildings, so the time to establish a routine was quite short (1-2 months) and there could be several month period before the same caregivers had Paro again in their department. This made difficult to domesticate Paro as part of the daily routines. The caregivers also tended to forget using Paro even when they had access to it. Also the perceived cost and fear of breaking restrained the use of Paro, since it had to be stored in a locked office backroom, which made it slow to take into use when needed.

The caregivers seemed to lack information and knowledge of how to take advantage of Paro in a proper way. Paro was mainly seen as a recreation object in resident group meetings. The caregivers were not knowledgeable of using it as a tool in different situations, e.g. to facilitate interaction between visitors and the elderly, or using it for therapeutic purposes. The caregivers were unsure of its physical durability as well as hygiene and how to clean the robot. Also, the caregivers thought that using Paro may require certain personal characteristics from the caregiver herself. They have to be able to read the use situation and understand how the elderly reacts to Paro. They also have to understand, in which kind of situations using Paro is appropriate and beneficial (this depends e.g. on the state of the memory illness). Furthermore, the caregiver has, at least to a certain extent, to be able to play a role that relates to use of Paro (e.g. pretend that Paro is a real animal). Not all caregivers are able or willing to do that.

When asked about expectations toward other kind of robotic applications in elderly care, their thoughts were quite contradictory. They were clearly aware of the current public discussion about "robots taking jobs" and "robots replacing caregivers" but did not see this becoming reality in elderly care: "*We are not in a factory*" and "*It is not the purpose that a robot replaces us*". The caregivers found robots to be good tools for dementia care for entertainment and recreation as well as fetch-and-carry tasks. When asked how interested they would be to apply social robots in their daily work, four of ten participants responded "very interested" and three responded "quite interested". Two responded "little interested" and none of them said to be "not at all interested".

On the other hand, they problematized using robots for these tasks to the extent the tasks were seen as part of the caregiving activity (taking care of the resident). For instance, a caregiver bringing clean clothes to the closet in a resident's room was seen as an event of recreation itself for the elderly person staying in that room. At the same time it would be an opportunity for the worker to monitor the health status of the resident. Also, the residents were seen to have too few human contacts since their children and relatives live far away, and may still be in the working life: "*I do wish, somehow, that there was still a human being for meeting and communication, another human being to be there*". Robots lifting residents received no trust. The caregivers felt that a robot could not replace another human as a co-worker: "*You only need to look the other to the eye and we know*." Also, they doubted whether a robot could perceive whether the resident feels pain, anxiety or fear during physical contact, and be able to relieve it, as this can be challenging for a human worker as well.

Overall, for these caregivers the experience of adopting

Paro meant changing their pre-assumptions about (unnecessary) cost and childishness of Paro to acceptance and positive perception of the device through concretely seeing and perceiving its impact on the elderly residents. The positive experiences did not however lead to routine or systematic use of Paro as a part of care work, due to lack of continuous access, information and sharing knowledge, and courage or encouragement to try Paro out in different situations, and practical issues such as hurry and distance to the storage place of Paro.

The care work was seen as "humane" in its nature but the caregivers were still all interested to try new robotic applications in their work, also for social purposes. However, it is hard to say whether this interest owns something to the use experiences with Paro, as it was not necessarily seen as a real robot that "*stands with two legs and has two hands*". Paro was a positive experience and "*better than a robot*".

5 DISCUSSION AND CONCLUSIONS

In this paper we have presented the results from case studies in Finland regarding robotics in elderly care services. We have described the technology procurement processes at case organizations A and B from the perspective of decision-makers, the expectations the organizations have towards robotics and new technologies in general in the elderly care service industry, and practical user experiences of Paro therapy robot from the perspective of care personnel.

From the perspective of decision makers in the care organization, the criteria and expectations regarding technology vary very much depending on what kind of technology is being procured. Because utilizing robotics in the daily care work is still very new in Finland, the expectations are very different compared to e.g. ICT technologies. Social robots are not considered as a necessity for the care homes, and factors like cost savings and increase of efficiency were not at the core of why they were purchased. The most important criteria stemmed from the curiosity towards new technologies and the possibility to bring different kind of activation and joy to the elderly. Another aspect was also the PR- and marketing value, and the belief that by implementing these types of technologies, the organizations can positively influence the overall attitude towards using robotics in the care industry and even allure new potential workforce to the field. Also having extra funds for procuring such kind of technology was emphasised in the public sector case organization.

In the case of Zora and Paro, the decisions were done top-down by the management, though for other technology procurements the role of care home managers and care personnel was highlighted, as ICT technologies enabling for example information sharing directly affect the work practises of employees working in the field. If they are not part of the decision process, the technology may be rejected. Regarding the hearing of their voice in the process, different kind of technology trials are conducted, after which an evaluation of the benefits and possible barriers is done based on the experiences of the care personnel. These experiences directly affect the decisions being made. Also training and internal marketing were considered very important in the implementation phase of new solutions. Regarding the needs and expectations towards other robotic technologies, solutions enabling safe and ergonomic lifting of the elderly were considered very interesting. Also robotics combined with ICT that enable the communication between the elderly and the family, were considered beneficial.

The focus groups with professional caregivers reveal that there is interest in robots also at grass-roots. The caregivers would like to try out different applications in their work. However, their expectations differed from the decision makers. The lifting robot that the decision makers were interested in was not accepted by caregivers due to distrust of its capability to adapt to the needs of the elderly nor the caregivers during lifting. The main motivation for the caregivers to use robots was to provide better care and increase the quality of life of the elderly residents (e.g., through entertainment), which was in line with the decision-makers. With this regard, Paro seems to be a worthy investment, as the caregivers value it for its visible positive social and emotional impact on the residents, even though they admitted to have had negative prejudices. However, the adoption of Paro has not been as successful as it could. The robot is not used to its full potential in the departments of the nursing homes due to the low availability of the robot (as it circulated between departments and buildings) and fear of breaking and unhygieny. Another important reason was that the caregivers lacked support for the use of Paro e.g., in the form of sharing experiences and knowledge with other caregivers and formal training - even the purchase of Paro was partly justified by the training provided by the selling company.

Overall, Finland appears to be a fertile ground to test and develop robotic applications for elderly care, at least when considering the viewpoints of caregivers and decision makers in dementia care. Based on our results, the main motivation to take robots into use in dementia care is the quality of care and life of the elderly people, not so much the costs, efficiency or productiveness of care (cf. [3]). This current "soft" view of the purpose of robots in dementia care enables purchasing robots just for curiosity and to gain PR-value. The social robots (Paro and Zora) bring joy and entertainment and help to give good care, but also raise interest and help overcome fears and prejudices towards care robots. However, the purchasers and sellers should already now pay more attention to the adoption process of care robots: as with any technology, their efficient and skilled use needs training and support. This aspect is only going to grow weight when care robots are expected to improve efficiency and decrease costs of care.

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